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**Ecological Systems Theory: Using Spheres of
Influence to Support Small-unit Climate and Training**

Tywanquilla Walker
U.S. Army Research Institute

March 2016

**United States Army Research Institute
for the Behavioral and Social Sciences**

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14. ABSTRACT Army teams operate in a complex organization that has many systems and levels. These small units (e.g., teams, squads) are generally studied from a process perspective, which posits that teams develop by progressing through a series of phases or stages (e.g., forming, storming, norming, performing). However, there is evidence that teams with standardized norms, differentiated team member roles, and interdependence among team members do not follow traditional team development processes. In contrast to taking snapshots of team development during a specified phase, ecological systems theory takes into account the roles, responsibilities, and influence of individuals inside and outside of the team. In the Army Ecological System (ARES), sphere of influence is used to describe individuals who have the ability to affect change and development within a system. These individuals affect the tasks, behaviors, and policies that are located at each system level. The ARES model is discussed, and a conceptual representation of the Soldier Ecological System (SEcoS) is presented. Test and validation of ARES is also discussed. Future research will investigate how ecological systems analysis can be used to better understand roles and spheres of influence at the individual, small unit, and military community level.					
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**Ecological Systems Theory: Using Spheres of
Influence to Support Small-unit Climate and Training**

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Brian T. Crabb, Chief

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ECOLOGICAL SYSTEMS THEORY: USING SPHERES OF INFLUENCE TO SUPPORT SMALL-UNIT CLIMATE AND TRAINING

EXECUTIVE SUMMARY

Research Requirement:

The purpose of this report is to examine how ecological systems theory can be used to support the training, mentorship, and development of Soldiers in small Army units (e.g., teams, squads). In contrast to team development stage theories like Tuckman's five-stage theory of forming, storming, norming, performing, and adjourning (Tuckman, 1965; Tuckman & Jensen, 1977), the ecological systems approach takes into account organizational structure and how various parts of an organization fit together and are expected to function. Organizational structure includes factors and people outside of the team that can either benefit team functioning or create barriers (Heinemann & Zeiss, 2002). Thus, ecological system theory can be used to: 1) identify the most influential individuals in the Soldier's sphere of influence, 2) identify meaningful, influential sources affecting attitudes and behaviors, and 3) identify how ecological systems can be used to better understand roles and spheres of influence at the individual, small unit, and military community level.

Procedure:

The framework for an Army Ecological System (ARES) was developed through a review of the industrial organizational and developmental psychology literature. Specifically, teams and team development theory, organizational context, organizational structure, ecology (i.e., the relations and interactions between organisms and their environment), and ecological systems theory were identified as important factors in the development of the ARES model. Bronfenbrenner's (1977, 1979, 1988) developmental ecological system was redefined and modified to represent the Army's organizational structure. An ARES model from the perspective of the junior enlisted Soldier was developed. The model is referred to as the Soldier Ecological System (SEcoS) and is diagramed in this report.

Findings:

Although Tuckman's five-stage model is one of the most prevailing models of team development, there is evidence that teams with standardized norms, differentiated team member roles, and interdependence among team members do not follow the traditional stage model. Specifically, the storming stage is absent or does not appear in the order described. Additionally, when teams (e.g., Army squads) have a strong organizational context, they do not have to pass through Tuckman's stages to perform effectively. Given that Army squads may not follow the Tuckman model of team development, ecological system theory was used to examine other aspects that influence team dynamics, behavior, training, and performance.

In ARES, sphere of influence is used to describe individuals who have the ability to affect change and development within a system. The individuals identified at each system level affect the tasks, behaviors, and policies within their sphere of influence. From an ecological

perspective, the individuals who are most likely to have a direct, immediate, and lasting influence on the Soldier are the individuals in the Soldier's immediate environment.

Utilization and Dissemination of Findings:

Army Ecological System research will allow the U.S. Army Research Institute for the Behavioral and Social Sciences and the Army to better understand how ecological systems theory and spheres of influence can be used to train, mentor, and develop Soldiers in small Army units. After ARES is tested and validated, research has the potential to extend into areas that are relevant to the Soldier, yet may extend beyond the Army environment. For example, spheres of influence both within and outside of the Army can be studied and incorporated into the ARES model. These areas include broader networks and systems, such as the family unit and social networks. The ARES model can be used to accurately represent the complex Army environment and examine Army squads from a multifaceted and developmental perspective. The ecological systems approach is a perspective that can be applied across multiple contexts and in multiple settings.

ECOLOGICAL SYSTEMS THEORY: USING SPHERES OF INFLUENCE TO SUPPORT SMALL-UNIT CLIMATE AND TRAINING

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Ecological Systems Theory: Using Spheres of Influence to Support Small-unit Climate and Training

“If we can stand on our own two feet, it is because others have raised us up. If, as adults, we can lay claim to competence and compassion, it only means that other human beings have been willing and enabled to commit their competence and compassion to us – through infancy, childhood, and adolescence, right up to this very moment.”

– Urie Bronfenbrenner (1978)

Army squads exist in a complex, interpersonal work environment. For example, squad members live and work together, there is pre-established leadership, there are training requirements, and there is a history of Army customs and traditions. By living and working together, Army squads learn skills and levels of functioning that cannot be readily taught from books. Instead, lessons are experienced firsthand. This real world application of teamwork in Army squads produces an environment that allows teams to create more together than an individual could alone.

Army squads are high performance teams, and they are required to operate at high levels while under stress. As a result of working and living together in stressful situations, squad members know each other's strengths and weaknesses. They learn each other's jobs. They know each team member's motivators and aggravators. They endure hardships together – as a family, as a unit, and as a team. When team members live and work so closely together, and function as a collective, they know each other as well as they know themselves. Training together, enduring together, failing together, and succeeding together creates a bond that is unparalleled by teams that exist outside of a military environment (see e.g., Siebold, 2007; Whitehouse, McQuinn, Buhrmester, & Swann, 2014).

Given that the Army is a way of life in which all facets of a Soldier's existence are touched and shaped by work-life relationships with fellow Soldiers, it is important to understand the factors that influence the behavior, performance, and climate of Soldiers and Army squads. It is also important to understand how to best influence Soldier development and training. Thus, the entirety of the multifaceted Army environment must be examined.

Ecology (i.e., interactions between organisms and their environment) and the ecological systems approach offers a way to examine the Soldier's environment from many vantage points, in contrast to taking snapshots of team development during a specified task. Therefore, an ecological systems model can be used to accurately represent the complex Army environment and examine Army squads from a multifaceted and developmental perspective. The ecological systems approach is a perspective that can be applied across multiple contexts and in multiple settings.

Teams and Team Development

Teams are intact social systems with boundaries, interdependence among members, differentiated member roles, and a shared purpose. Teams operate in an organizational context, have one or more tasks to perform, have collective responsibility, and, as a collective, manage relations with other individuals or groups in their larger social system (Hackman, 1990).

Teams and team development are often studied from an industrial organizational perspective. This perspective usually focuses on team composition, task completion, how individuals work together and interact in a specific setting, and organizational context (i.e., management processes used to set and meet objectives; organizational culture, values, and beliefs; and human resource management via mechanisms such as feedback, rewards, recognition, education, or training; Doolen, Hacker, & Van Aken, 2003). All of these factors are important for understanding team processes and team development. Specifically, organizational context is useful for determining the value organizations place on teams and teamwork. Organizational context can also influence team functioning and team development.

In general, team development is viewed from a process perspective, with the underlying assumption that teams develop in a series of phases or stages and that progressing through these stages results in successful team performance. The model focuses on internal team processes and team composition. For example, one of the most prevailing models of team development and functioning is Tuckman's (1965; Tuckman & Jensen, 1977) five-stage model of forming, storming, norming, performing, and adjourning (see Figure 1 for descriptions of the stages). In his original and subsequent work, Tuckman examines the literature and discusses different types of teams and the common developmental processes of teams. However, Tuckman also states that sometimes stages are missing or unobserved and that most literature regarding the five-stage model is theoretical, not empirical. Moreover, Tuckman's literature review did not contain a representative sample of each team type. Yet, the Tuckman model is one of the most widely used models of team development in industry, academia, and the military (see e.g., Bonebright, 2010; U.S. Army, 2009).

Although Tuckman's model is useful for developing a framework for team development, it does not encompass the complexity and organizational context that is characteristic of the Army and the small units (e.g., squads, teams) that are the Army's foundation. Specifically, the Army's strong organizational context provides the rules, task definitions, information, and resources needed for the team to become immediately effective. Contextual forces remove the need to develop plans, assign roles, determine and allocate resources, set norms, resolve conflicts, and go through the other stages mentioned in traditional models of team development (Guzzo & Shea, 1992). Thus, some of the traditional assumptions about teams (e.g., teams are not ready to perform effectively when they are formed; teams have definite lifespans; team members do not change and are not interchangeable; at the outset, teams do not have leaders and leadership must be established) may not apply to Army squads.

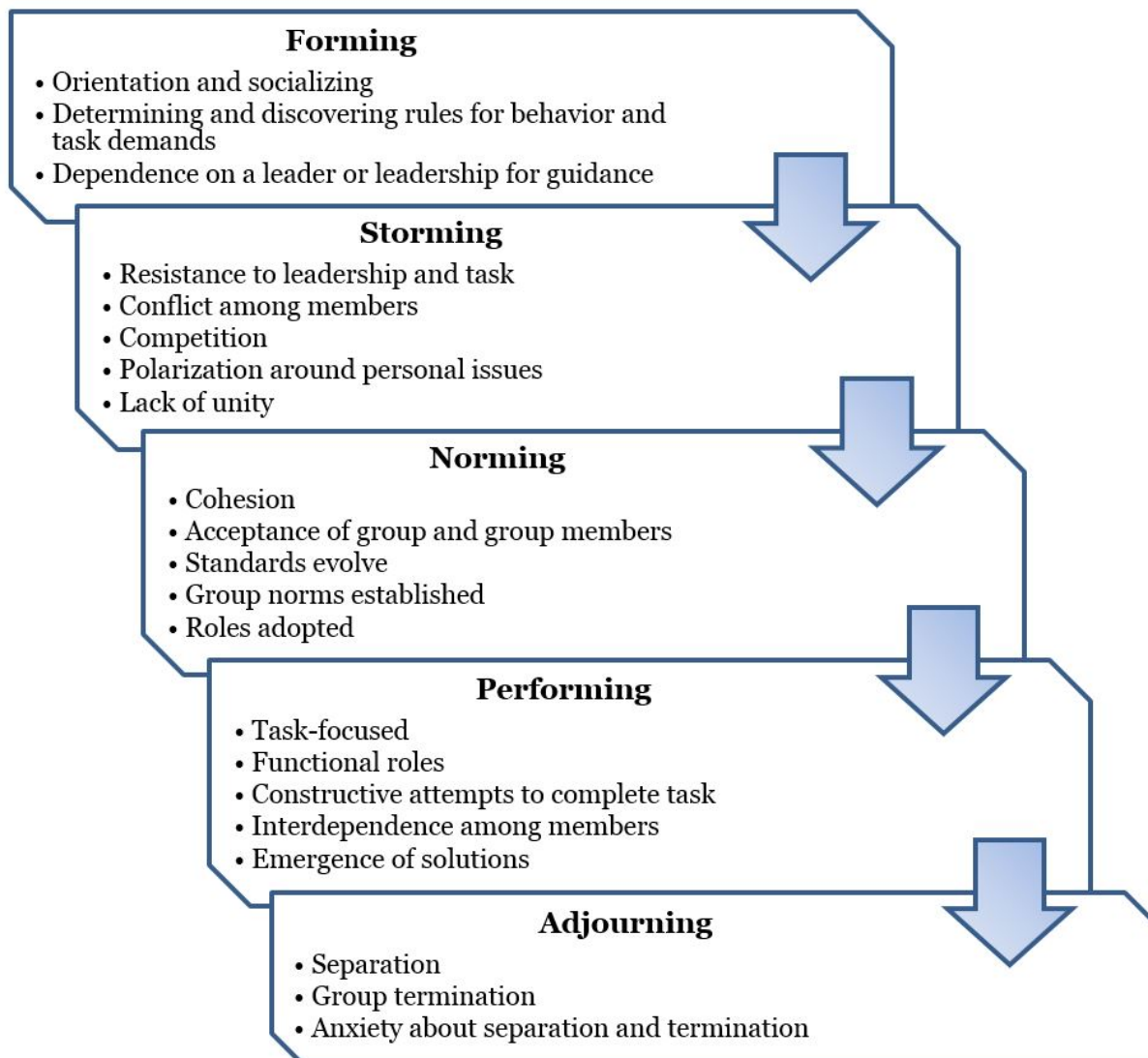


Figure 1. Diagram of Tuckman's model of team development. The model consists of five stages: forming, storming, norming, performing, and adjourning.

Additionally, there is evidence that production teams, task-oriented teams, technical teams, teams with organizational support, and teams with standardized norms do not follow the model proposed by Tuckman. Most notably, the storming stage is absent or does not appear in the sequence as described (Cassidy, 2007; Center for Army Lessons Learned, 2015; Combined Arms Center, 2009a, 2009b; Ginnett, 1990; Knight, 2006, 2007). For example, airline cockpit crews with established organizational norms and explicitly stated tasks may skip the storming stage and go from forming directly to norming then performing (Ginnett, 1990). Airline crews come together quickly and perform effectively because there is standardization of duties and the need to deal with new and complex situations (e.g., a difficult landing in adverse weather conditions) as they arise. These teams are able to move quickly from formation to performance because team members know their duties, there are time constraints, and professional behavior is an expected norm.

Storming may occur more in settings emphasizing personal interaction (e.g., therapy group) than in settings emphasizing professional interaction (e.g., cockpit crew, technical team, Army squad) where each team member's personal success is dependent upon the collective success of the team (Knight, 2006, 2007). In short, when there is strong organizational context, differentiated team member roles, and interdependence among team members, teams do not have to pass through Tuckman's stages to perform effectively. Given that squads may not follow the traditional model of team development, there is a need to acknowledge other aspects that influence team dynamics, team member behavior, training, and, ultimately, team performance.

Incorporating Organizational Structure: Ecology and Ecological Systems Theory

In light of evidence that a process perspective of team development may not apply to Army squads, it is imperative to note that team development and performance are also functions of the system in which the team operates. However, only recently has the influence of individuals outside of the team and the effect of organizational structure (i.e., foundation of an organization that refers to how various parts of the organization fit together and are expected to function; e.g., values and expectations; assignment of leaders; availability and allocation of resources; see e.g., Brallier & Tsukuda, 2002; Heinemann & Zeiss, 2002) been considered as significant factors of team development. In contrast to focusing specifically on team processes, organizational structure delineates factors outside of the team that can either benefit team functioning or create barriers (Heinemann & Zeiss, 2002).

Since a team functions as part of a complex organization, a model of team development, functioning, and performance must: 1) integrate the team into the organization, 2) take into account the roles, responsibilities, and influence of individuals inside and outside of the team, and 3) examine how organizational structure affects the team's ability to accomplish the team's mission and the organization's mission. The ecological systems approach offers a way to incorporate organizational structure into a model of team development. The ecological approach also allows for the examination of team and Soldier development in the Army's complex organizational structure.

Ecology refers to the relations and interactions between organisms and their environment, which includes other organisms. The ecological systems environment is a nested arrangement of

structures, each contained within the next; and the settings and contexts of human development are viewed as multiple systems within a larger system. Environmental structures, and the processes taking place between and within those environments, are viewed as interdependent.

Ecological systems theory was originally conceptualized as a child development theory that explored the social, emotional, biological, and cultural aspects in the environment of the developing child. The theory posits that human interactions, institutions, beliefs, and value systems have a profound impact on the developing child (see Figure 2 for a diagram of a child ecological system). The ecological system is composed of five systems: the microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Brim, 1975; Bronfenbrenner, 1977, 1979, 1988; Bronfenbrenner & Morris, 1998). The microsystem focuses on the relations between the developing person and other people, structures, or processes in the immediate environment. The mesosystem contains the interactions among the settings containing the developing person. The exosystem contains the formal and informal social structures that indirectly affect the developing person. The macrosystem consists of the beliefs, expectations, and lifestyle of the developing person's cultural setting. The chronosystem refers to time and the influence that changes over time have on a person's development. Ecological systems theory terms can be redefined and modified to better represent the complexity and distinctiveness of the Army and Army squads.

Army Ecological System: Redefining the Terms

The squad is the smallest tactical element in the Army organizational structure. Typically, there are nine to 10 Soldiers in an Army squad. However, depending on the function of the squad, squad size may vary from four to 16 Soldiers. A squad is led by a non-commissioned officer (NCO). The NCO is either a staff sergeant (E-6) or a sergeant (E-5). Sergeants and corporals (E-4) generally serve as team leaders. Additional squad members are junior enlisted Soldiers (i.e., privates and specialists; private (E-1), private (E-2), private first class (E-3), and specialist (E-4)). If, for example, a nine-member squad is composed of two teams, the staff sergeant would be the squad leader. Each team would have four personnel – one sergeant (or corporal) serving as team leader and three junior enlisted Soldiers as squad members (see Figure 3 for an example of a nine-member squad with two teams). Squads are the Army's foundation, and the smallest tactical units. Therefore, Army Ecological System (ARES) research should begin at the squad level.

In addition to squads being the Army's building blocks, a squad's junior enlisted Soldiers are usually the newest members of the Army. They are interacting with new people, acquiring new skills, and adapting to being members of the armed forces. While learning their jobs and performing assigned duties, they are gaining knowledge of Army culture and being taught Army values. Squad NCOs are responsible for training, leading, and taking care of these Soldiers. The NCOs also provide leadership for building and strengthening the team; and they ensure that their Soldiers are prepared to function as effective team members (U.S. Army, 2000). These interactions and experiences have a profound impact on the developing Soldier.

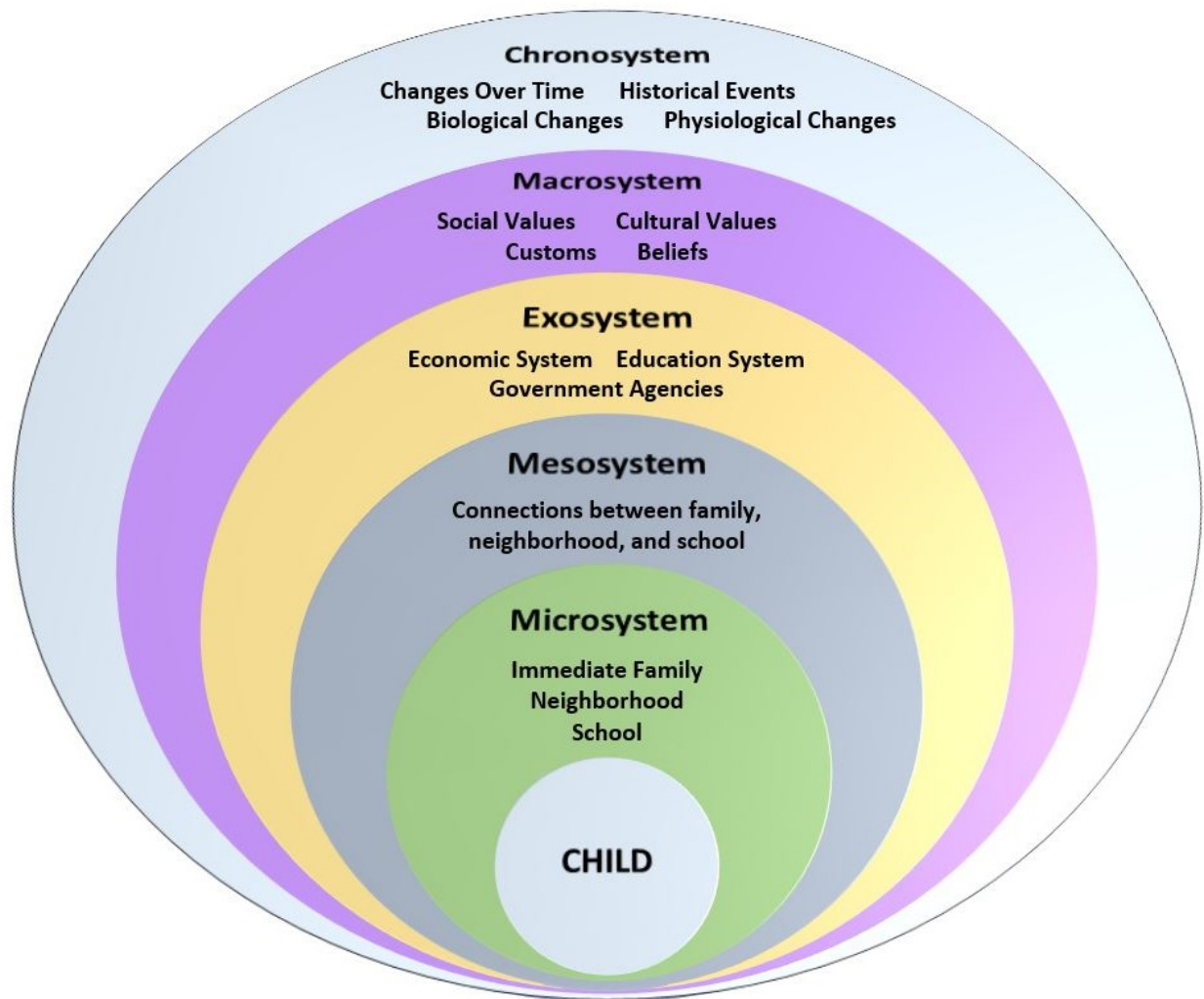


Figure 2. Diagram of a child ecological system. Ecological systems theory was conceived as a child development theory that explored the social, emotional, biological, and cultural aspects in the environment of the developing child.

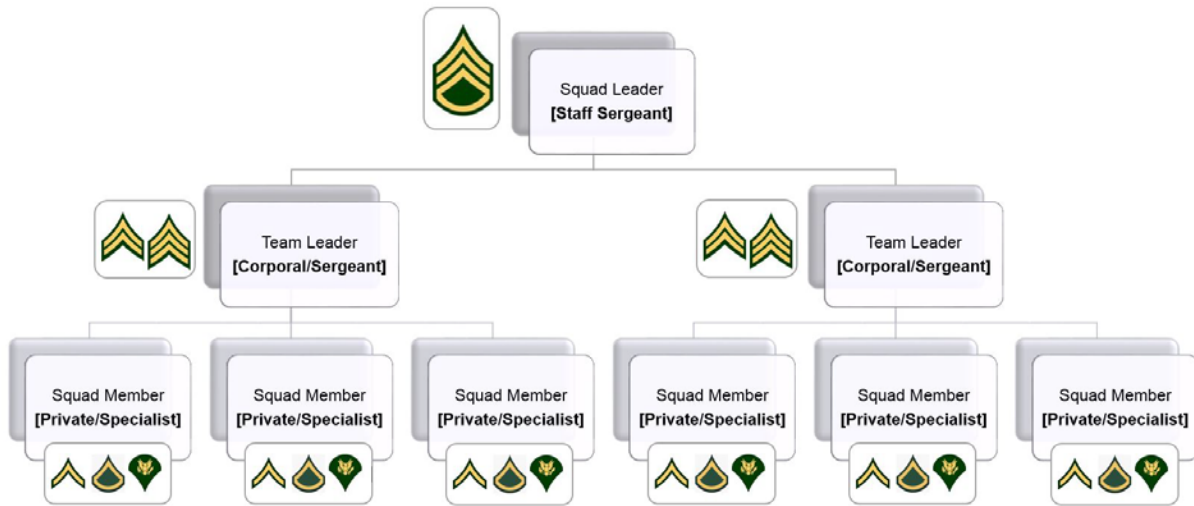


Figure 3. Diagram of a nine-member squad with two teams. The squad leader is a staff sergeant (E-6). Each team has a team leader who is either a corporal (E-4) or a sergeant (E-5). Squad members are privates and specialists: private (E-1), private (E-2), private first class (E-3), and specialist (E-4). Rank insignia are pictured for all personnel. Private E-1 has no insignia.

Given that the squad level is where Soldiers receive formative training, and develop as members of the Army, the Army Ecological System described below focuses specifically on the junior enlisted Soldier. From the perspective of the Soldier, all of the elements of the ecological system are already in place. Namely, there are interactions between the Soldier and fellow team members. There are leaders to provide guidance and instruction. There are formal and informal social structures, expectations to meet, and values to uphold. At the center of this active system is the developing individual, the junior enlisted Soldier.

In ARES, the individuals identified at each system level influence the tasks, behaviors, and policies within that ring (i.e., sphere of influence). In applying ecological systems theory to the Army, sphere of influence is used to describe the individuals who have the ability to affect change and development within a system. The influence of the people closest to the Soldier in the system can be used to improve training and enhance Soldier development. For example, for outcomes of competence (i.e., the demonstrated acquisition and further development of knowledge and skills), proximity and proximal processes lead to higher levels of developmental functioning and act as buffers against the effects of disadvantaged and disruptive environments (Bronfenbrenner & Morris, 1998). Thus, the most effective training would come from a meaningful, close, influential source.

From an ecological perspective, the individuals who are most likely to have a direct, immediate, and lasting influence on the Soldier are the individuals in the microsystem (i.e., the Soldier's immediate environment). For example, for sensitive or hard-to-train topics (e.g., suicide prevention; dignity, respect, and inclusion), would the message be more impactful when delivered by a Soldier's squad leader or by a civilian instructor? An individual who is close to the Soldier may be more influential than someone who does not know the Soldier but is qualified to give the training. Hence, the squad leader may be better able to implement, and reinforce, the

training. Ecologically, it is important to consider how each person in a sphere of influence affects the training, attitude, behavior, and development of the Soldier.

The Soldier is at the heart of ARES, and each system level contains individuals and elements within that sphere of influence (see Figure 4 for a diagram of ARES from the perspective of the junior enlisted Soldier). By specifically including individuals and affected elements, the Soldier Ecological System (SEcoS) can be defined as follows:

- **Microsystem** – The microsystem deals primarily with the people who lead, train, and care for the Soldier (e.g., Squad Leader, Team Leader, Squad Members) and interactions between the Soldier and other people in the immediate environment. The microsystem includes structures and processes (e.g., counseling, behavior, training, welfare and well-being, morale, beliefs, physical fitness, mentorship, discipline) taking place in the Soldier's immediate environment.
- **Mesosystem** – The mesosystem is a system of microsystems. The mesosystem contains the connections, interactions, and relationships that exist between two or more microsystems (e.g., the relations between the Squad Leader and counseling, counseling and behavior, mentorship and morale, Squad Members and the Team Leader).
- **Exosystem** – The exosystem consists of formal and informal social structures that may not involve the Soldier as an active participant but impinge upon or encompass his/her immediate environment. These social structures (e.g., platoon, company), and the people in them (e.g., Platoon Leader, Platoon Sergeant, Company Commander, Company First Sergeant, Company Executive Officer), influence, delimit, and determine what goes on in the Soldier's environment. For example, the Platoon Sergeant's interactions with the Squad Leader will affect the Soldier, even if the Soldier has not had direct contact with the Platoon Sergeant. Additionally, the exosystem encompasses the post or installation, the distribution of goods and services (e.g., post services, distribution of resources such as ammunition, fuel, and rations), and communication and implementation of policies (e.g., administrative policies, personnel policies) and orders.
- **Macrosystem** – The macrosystem consists of the ideology, cultural values, customs, and traditions of the Army. The macrosystem involves the interaction of the Soldier with the beliefs, expectations, and lifestyle of the Army's cultural setting (e.g., ceremonies, traditions, uniform standards, post policies, Army regulations and policies, Army values). People (e.g., Army Chief of Staff, Sergeant Major of the Army, Battalion Commander, Command Sergeant Major, Brigade Commander, Post Commander) who influence Army policies, values, and customs are also included in the macrosystem.
- **Chronosystem** – The chronosystem refers to time and the influence that changes over time have on the development of the Soldier. The chronosystem includes sociohistorical conditions (e.g., wartime, peacetime, changes in Army policy) and life events and experiences (e.g., time in grade, time in service, promotion, size of professional network, number of people under one's command). Events may be external (i.e., in the environment) or internal (i.e., within the Soldier).

Test and Validation of the ARES Model

Figure 4 is a conceptual representation of the ARES model. However, before it can be implemented, the model must be tested and validated. The first step is to identify the tasks, behaviors, topics, trainings, and policies that affect Soldiers. Next, identify the individuals with the greatest influence in each area. After identifying the model's elements and influential individuals, define spheres of influence and construct a model that details the ecological systems environment from the Soldier's perspective.

When constructing the model, it is important to acknowledge that the structure and elements of the model may vary as a function of factors such as squad or team composition, military occupational specialty (MOS), mission, work or training setting, task, role of the squad or team, roles of the individuals within the squad or team, and the duration of the squad or team's existence. Given that the ARES model encompasses multiple system levels, and is a broad representation of the Army's multifaceted organizational structure, the model is versatile enough to apply to a myriad of contexts. For example, in the conceptual model, the Platoon Sergeant is located in the exosystem. However, depending on the unit type and the mission of the unit, the Platoon Sergeant may be an influential figure in the Soldier's immediate environment. Thus, the Platoon Sergeant would be located in the Soldier's microsystem.

Additional factors and questions to consider include: How does the structure of the model differ by task or domain (e.g., mission relevant task, training domain, social domain)? How do the ARES model and spheres of influence differ from the perspectives of junior enlisted Soldiers, non-commissioned officers, and officers? After taking into account the factors that may affect the composition of the model, the model should be validated to ensure that spheres of influence and elements of the ecological systems environment are characterized from the perspective of the Soldier who is at the center of the model. Moreover, after testing and validation, ARES research should further examine how ecological systems analysis of small Army units can be used to better understand roles and spheres of influence at the individual, small unit, and military community level.

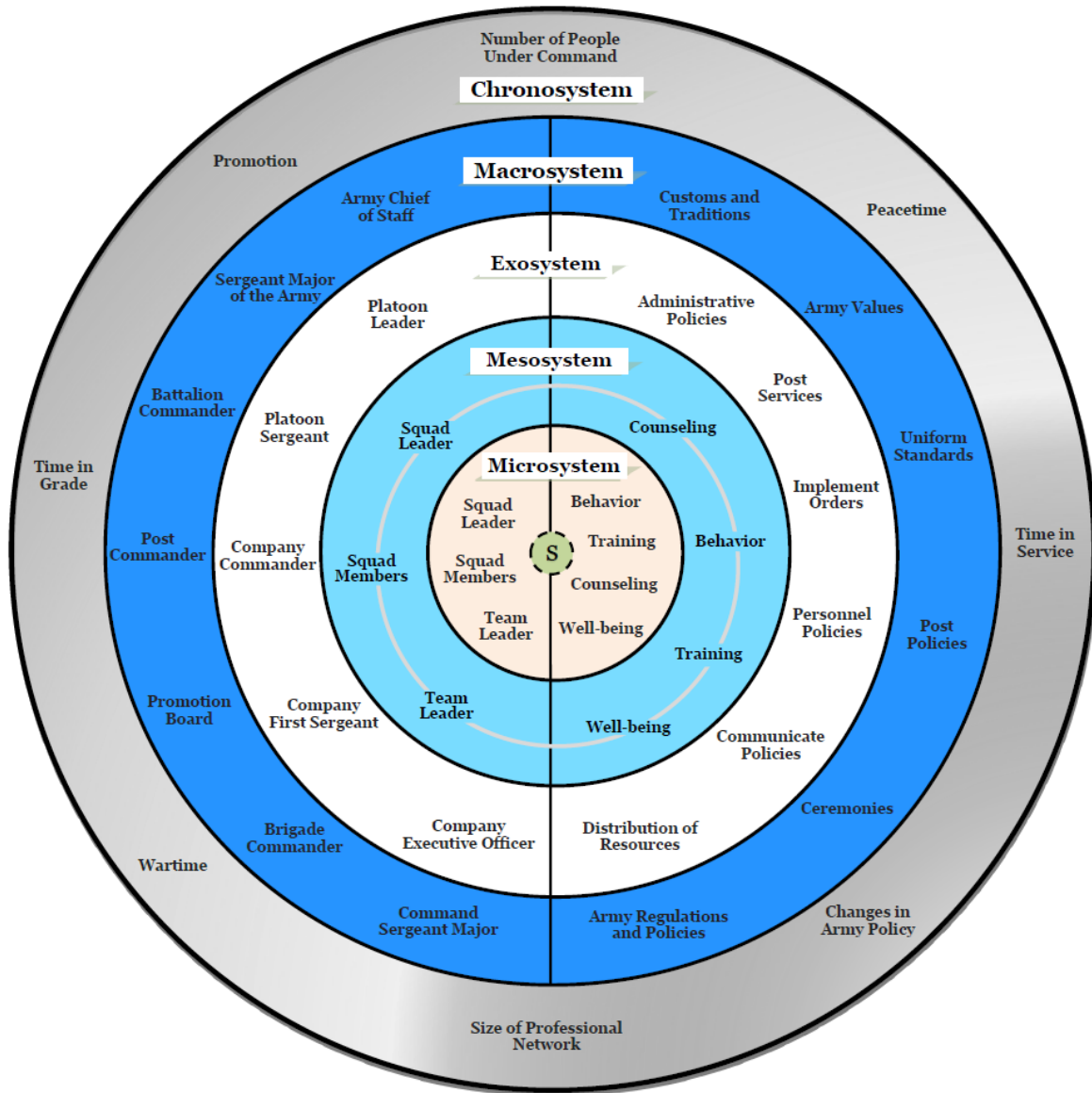


Figure 4. Soldier Ecological System (SEcoS). Diagram of the Army Ecological System (ARES) from the perspective of the junior enlisted Soldier. The Soldier (S) is at the heart of ARES. At each system level, people are listed on the left and the tasks, behaviors, or policies that they influence are listed on the right. Each ring represents a sphere of influence.

Future Research

After ARES is validated, and organizational structure has been incorporated into the model, future research can examine spheres of influence that affect the Soldier and extend beyond the individual and small unit level. For example, the ARES model has the potential to identify spheres of influence from the perspectives of Soldiers of different ranks and in different MOSs. From a rank perspective, a trajectory of change can be established. The trajectory would detail how spheres of influence change over the course of a Soldier's career. Who is most influential and best suited to train Soldiers as their careers progress? Is a specific type of mentor, coach, trainer, or counselor better suited to motivate and inspire the emerging leader? Does the current organizational structure and organizational context support future Army needs and resource projections?

From an MOS perspective, the ecological systems approach can address these questions as they pertain to specific job functions and duties. In addition to determining trajectories of change and evaluating mentorship, ARES is useful for determining how individuals in each sphere of influence impact performance and performance measures. How does each system level, and sphere of influence, contribute to meeting and exceeding performance objectives? How does the ARES model differ across MOSs? Is the job performance level of some MOSs (e.g., infantryman, human resources specialist) more susceptible to changes in Army policies and organizational structure than others? All of these questions can be investigated using an ecological systems approach.

After an ecological framework is established, research has the potential to extend into areas that are relevant to the Soldier, yet may extend beyond the Army environment. These areas include broader networks and systems, such as the family unit and social networks. Similar to evaluating the system level and influence of individuals in the Army, the system level placement and spheres of influence of family members can be addressed. How do family members influence a Soldier's well-being and health? How does Army organizational structure and context impact the family unit, and thus, impact the Soldier? What is the best way to integrate the family ecological system and ARES so that the Soldier and the Army achieve maximum performance and benefit? How does the family unit impact ARES at the individual, small unit, and military community level?

The future of ARES research is broad and varied. Spheres of influence both within and outside of the Army can be studied and incorporated into the ARES model. The ecological systems approach provides the opportunity to view Soldiers as part of a larger system, instead of examining individuals or small units in isolation sans organizational structure or context. Furthermore, the ecological systems approach can be used to study and understand multiple topics individually (e.g., rank) or simultaneously (e.g., integration of the family ecological system and ARES).

Conclusion

In sum, understanding spheres of influence can inform effective training and mentorship practices and identify meaningful, influential sources affecting Soldiers' attitudes and behaviors.

Ecological systems theory also has implications for how Soldiers are trained and how training resources are utilized. The development of an ARES model will aid in understanding small-unit climate and training in the context of the larger Army Ecological System. Moreover, the ARES model will be beneficial for designing and implementing training that utilizes the Army's greatest resource, the individuals who are in the ecological system, and thus in the Soldier's sphere of influence. Spheres of influence can be extended to include career trajectories and the Soldier's family unit.

“...[T]he understanding of human development demands going beyond the direct observation of behavior on the part of one or two persons in the same place; it requires examination of multiperson systems of interaction not limited to a single setting and must take into account aspects of the environment beyond the immediate situation containing the subject” (Bronfenbrenner, 1977, p. 514). In the context of the Army, the subject, or person of interest, is the Soldier. Thus, the goal of ARES is to examine, and address, the entire environment of the Soldier as well as who and what is in the environment. Using an ecological systems approach, one can take any Army element or topic, determine its ecological system level, and then determine who is in the Soldier's sphere of influence. Once the sphere of influence is determined, steps can be taken to assess who is best suited to undertake the task of training the Soldier.

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